

identified in the haemolymph of *Apis cerana* of the plains while that of the high hills showed six protein fractions. Only one fraction corresponding to molecular weight 67 kD was shared between them, and was also present in *A. dorsata*, but absent in *A. mellifera* (Table 1), suggesting that it is characteristic of Asian species. The protein profile of populations from high hills and plains of *A. cerana* was found to be very different. This is in accordance with the suggestion of Aseo and Laude (1993), that electrophoresis data has the potential for the identification of sub-species within each species and as a marker for population structures.

The presence of a larger number of protein fractions in *A. cerana* of plains is perhaps indicative of the influence of floral food sources on the haemolymph composition. The botanical garden of Panjab University, from where these bees were collected, was blooming with spring flora, including

ornamentals and fruit trees such as *Prunus amygdalus*, *Prunus padam*, *Prunus domestica*. Abdel and Wahab (1970) also observed the effect of the host plant on the haemolymph composition of *Spodoptera*.

Kumar and Kamal (1999) and Kamal (2000) studied the protein composition of hypopharyngeal glands in *A. cerana* and *A. mellifera*, and also compared the protein fractions in the royal jelly. Kamal (2000) suggested a systematic significance of the variations found in these.

ACKNOWLEDGEMENT

We thank the Chairman, Department of Zoology, Punjab University, Chandigarh for the research facilities provided.

REFERENCES

- ABDEL, W.A.M. & A.M.A. WAHAB (1970): Free amino acids in the haemolymph of six lepidopterous larvae species. *Bull. de. La. Soc. 'd. Egypte* 54: 81-85.
- ASEO, S.C. & R.P. LAUDE (1993): Alkaline phosphatase polymorphism in *Apis mellifera* and *Apis cerana* in Los Banos, Laguna, Philippines. Pp. 57-63. *In*: Connor, L.J., T. Rinderer, H.A. Sylvester & S. Wongsiri (Eds.), Asian Apiculture. Wicwas Press, USA.
- KAMAL, S. (2000): Studies on royal jelly producing hypopharyngeal glands of honeybees. M.Sc. (Hons) Dissertation submitted to the Panjab University, Chandigarh.
- KUMAR, N.R. & S. KAMAL (1999): Cytochemical characterization of royal jelly producing hypopharyngeal glands in honey bee. *Pest manag. eco. zool.* 7(2): 111-114.
- LAEMMLI, U.K. (1970): Cleavage of structural protein during the assembly of the head of the bacteriophage T4. *Nature* 222: 680-685.
- LEE, M.L., Y.H. YIN, S.S. KIM, K.S. WOO & D.S. SHU (1989): Malate dehydrogenase and non-specific esterase polymorphism in *Apis mellifera* L. and *Apis cerana* F. in South Korea. *Kor. J. Apic.* 4(2): 68-74.
- MESTRINER, M.A. (1969): Biochemical polymorphism in bees (*Apis mellifera ligustrica*). *Nature* 223: 188-189.
- MESTRINER, M.A. & E.P.B. CONTEL (1972): The P-3 and Est loci in the honeybee *Apis mellifera*. *Genetics* 72: 733-739.
- SHEPPARD, W.S. & S.H. BERLOCHER (1989): Allozyme variation and differentiation among four *Apis* species. *Apidologie* 20: 419-431.
- SYLVESTER, H.A. (1986): Biochemical Genetics. *In*: Rinderer, T.E. (Ed.), Bee Genetics and Breeding. Harcourt Brace Jovanovich Publisher, Orlando, Florida. 426 pp.

20. A PREY-PREDATOR LINK BETWEEN THE ROCK BEE *APIS DORSATA* AND THE FALSE VAMPIRE BAT *MEGADERMA LYRA* GEOFFROY BASED ON THEIR CIRCADIAN RHYTHMS¹

SUTAPA BISWAS²

¹Accepted June 23, 2004

²Department of Zoology, Acharya Prafulla Chandra College, New Barrackpore, Kolkata 700 131, West Bengal, India. Email: su_b23@yahoo.com

During observations, in March and April 1997, at the School of Life Sciences, Jawaharlal Nehru University, New Delhi, we found Rock Bee *Apis dorsata* hives hanging from the edge of the sunshade of the fourth floor of the school building. In the evenings, we would observe the last two mass flights, (Kastberger *et al.* 1996), of the bees, for around 5 and 10 minutes. The first mass flight occurred just before sunset, and the second during sunset. Two to three minutes before the mass flight, the False Vampire Bats (*Megaderma*

lyra Geoffroy) would appear and circle around the beehive ready to catch the flying bees.

Samples of both the mass flight of bees were collected (sample sizes 109, 57 and 44), using a butterfly net (attached with a long rod). The bees caught were chilled to make them unconscious and the number of workers and drones noted. Analysis of samples confirms that 78.5% of the bees were drones. The sample of an earlier mass flight showed only 4.3% drones (sample sizes 40, 38 and 37). The circadian

rhythm of the mass flight of stingless drones (worker honeybees of *dorsata* are endowed with venomous stings) and the starting of predatory forage of the False Vampire Bats coincide, thus making a prey-predator relationship possible.

REFERENCE

KASTBERGER, G., O. WINDER, T. HOTZL & G. RASPOTING (1996): Behavioural features of a periodic form of massed flight activity in the giant honeybee *Apis dorsata*. *Apidologie* 27: 1.

21. A NEW LARVAL FOOD PLANT OF THE COMMON ALBATROSS *APPIAS ALBINA* (BOISDUVAL), WITH A NOTE ON ITS MIGRATION IN KERALA¹

VINAYAN P. NAIR²

¹Accepted May 14, 2005

²XV/446 A1, Nethaji Housing Colony, Trichambaram, Taliparamba (PO), Kannur 670 141, Kerala, India.

Email: vinayanpnair@yahoo.co.in

The Common Albatross *Appias albina* (Boisduval) is a resident of evergreen and semi evergreen forests. It is also well known for its migratory habit (Home 1935; Williams 1938; Wynter-Blyth 1957; Larsen 1978, 1987a,b; Kunte 2000; Palot *et al.* 2002; Mathew and Binoy 2002).

Lepidopteran fauna exploration at Koyilandy, during November-January 2002 and 2003 resulted in a new host plant record – *Crateva religiosa* (Capparaceae) – for the Common Albatross *Appias albina* (Boisduval) (Lepidoptera: Pieridae). Later during December-February 2005, at Vatakara, I recorded the breeding of Common Albatross on the same plant.

Common Albatross *Appias albina* (Boisduval) reportedly feeds on *Drypetes oblongifolia*, *Drypetes roxburghii* and *Drypetes venusta* (Euphorbiaceae). The occurrence and successful rearing of *Appias albina* on *Crateva religiosa* confirms it as a new larval food plant.

Palot *et al.* (2002) reported migration of these butterflies starting from Coorg and passing through Aralam Wildlife Sanctuary of Kerala during November-January. Mathew and Binoy (2002) further reported a migration of butterflies at

the New Amarambalam reserve forest of the Nilgiri Biosphere Reserve. Palot (pers comm.) is of the opinion that from November to January there is a movement of butterflies from Coorg to Nilgiris passing through the eastern parts of Kerala. These reports confirm the dominance of Common Albatross in migratory flights.

The actual reason behind butterfly migration is still unknown. It is suggested that stimulation to migrate might be due to population outbreaks leading to depletion of host plants and adult food resources (Ford 1990; Gilbert and Singer 1975; Mathew and Binoy 2002). Nair (2005) reports the occurrence and breeding of Common Albatross outside forest areas in Kerala and also suggests the depletion of host plants as the reason for butterfly migration. The present record also strengthens this opinion.

ACKNOWLEDGEMENTS

I am grateful to Dr. C. Radhakrishnan (Joint Director, ZSI, WGRS, Kozhikode) and Md. Jafer Palot for encouragement and facilities.

REFERENCES

- FORD, E.B. (1990): Butterflies. Revised 5th edition. William Collins Sons & Co. Ltd., London, 352 pp.
- GILBERT, L.E & M.C. SINGER (1975): Butterfly Ecology. *Annual Review of Ecological Systems* 8(2): 297.
- HOME, L.W.M. (1935): Notes on Coorg butterflies. *J. Bombay Nat. Hist. Soc.* 37: 669-674.
- KUNTE, K. (2000): India – A Lifescape. Butterflies of Peninsular India. Universities Press, Hyderabad. 288 pp.
- LARSEN, T.B. (1978): Butterfly migrations in the Nilgiri Mountains of southern India. *J. Bombay Nat. Hist. Soc.* 74: 546-549.
- LARSEN, T.B. (1987a): The butterflies of the Nilgiri Mountains of southern India. (Lepidoptera: Rhopalocera). *J. Bombay Nat. Hist. Soc.* 84: 26-54.
- LARSEN, T.B. (1987b): Butterfly Migrations in South India. *Blackbuck* 3(1).
- MATHEW, G. & C.F. BINOY (2002): Migration of butterflies (Lepidoptera: Rhopalocera) in the New Amarambalam Reserve forest in the Nilgiri Biosphere Reserve. *Zoos' Print Journal* 17(8): 844-847.
- NAIR, V.P. (2005): A note on the occurrence of Common Albatross, *Appias albina* (Boisduval) (Lepidoptera: Pieridae) at the St Joseph's College Campus, Devagiri, Kozhikode, Kerala. *Zoos' Print Journal* 20(5): 1874.
- PALOT, M.J., C. RADHAKRISHNAN, V.C. BALAKRISHNAN & BABU KAMBRATH (2002): A report on the migration of butterflies in Aralam Wildlife Sanctuary, Kerala. *Zoos' Print Journal* 17(2): 722.
- WILLIAMS, C.B. (1938): The migration of butterflies in India. *J. Bombay Nat. Hist. Soc.* 40: 439-457.
- WYNTER-BLYTH, M.A. (1957): Butterflies of the Indian Region. Bombay Natural History Society. Bombay. 523 pp. + 72 pls.